National Aeronautics and Space Administration
Contract No. NASw-6

ASTRONAUTICS INFORMATION

Translation No. 9

SPACE INVESTIGATIONS - SELECTED TRANSLATIONS

Izvestia, July 7-8 and September 2, 1959

Translated by

J. L. Zygielbaum

pp ii-iii, 1-13

JET PROPULSION LABORATORY
California Institute of Technology
Pasadena, California
September 10, 1959

TRANSLATOR'S PREFACE

This series of short articles, translated from the Soviet newspaper Izvestia during recent months, deals with a successful launching and recovery of instruments and experimental animals flown in a high-altitude geophysical rocket, and with calculations of the position and motion of the first Soviet lunar probe, tracing its path around the Sun. The translations are offered with the double purpose of presenting information on Soviet space research and of affording an estimate of the Soviet press and general reaction to such research.

I. HIGH-ALTITUDE FLIGHT OF EXPERIMENTAL ANIMALS

A. Izvestia, July 7, 1959

1. TASS Communique: THE ASSAULT ON THE UPPER ATMOSPHERE CONTINUES

The Launching of Another Geophysical Rocket with Instrumentation and Animals

As is known, the Soviet Union has conducted a systematic investigation of the upper atmosphere with the help of single-stage ballistic missiles at various altitudes over a period of several years.

During the previously conducted launchings, very valuable scientific data was obtained, which has again shed light on the contents of the upper atmospheric layers and the processes which take place in it, which was previously reported in the press.

On July 2, 1959 at 6:40 a.m. Moscow time, a single-stage intermediate-range geophysical ballistic rocket was launched in conjunction with scientific plans for the investigation of the upper layers of the atmosphere [Fig. 1].

The rocket was equipped with instrumentation for the study of the ultraviolet part of the solar spectrum, the structure of the ionosphere, the micrometeorite flux, and air-current velocity at various altitudes, and also for the determination of density, pressure, temperature, and contents of the atmosphere according to altitude.

In order to study the physiology of animals during ascent towards high altitudes, experimental animals were placed aboard the rocket: two dogs ("Courageous" and "Snowflake") and one rabbit. The dog "Courageous" had made two previous trips to the upper atmospheric regions.

The over-all weight of the launched rocket, including scientific equipment and animals, was more than 2000 kg.

The launching was normal. The rescue system made possible a safe landing of the container of scientific instruments and experimental animals, which had separated from the rocket.

Judging from preliminary data, the investigation program was accomplished successfully and valuable data and materials were obtained.

For the first time, information was obtained on the content of light gases in the atmosphere.

The condition of the animals after landing was fine. The repeated ascent of some of these animals permits data on the preparedness of animals for rocket flight to be obtained. This information is essential for future flights by human beings. New information was obtained on the behavior of animals under conditions of weightlessness.

The data obtained is being processed and studied.

2. A. Dorodnitsyn[1]: NEARING THE GREAT GOAL

The July 2 launching of the high-altitude geophysical rocket accomplished in conjunction with plans for the investigation of the upper atmosphere will add much new information to our knowledge about this little-studied region of the atmosphere.

---

[1] Academician of the Soviet Academy of Sciences.

The realization of humanity's great dream, flight beyond the regions of the Earth to other planets, cannot be realized without a full and reliable knowledge of the conditions which exist outside the atmosphere in interplanetary space.

What is the probability of a future cosmic ship's colliding with meteorites which, due to their great velocities, represent a serious danger to this ship?

What is the intensity of various types of radiation (cosmic, ultraviolet, and corpuscular solar radiation) which may prove to have an essential influence on living organisms?

Finally, how will the live organisms react to the unusual conditions of cosmic flight, acceleration during the rocket's ascent, weightlessness, and intense radiation fluxes?

We should have clear and accurate answers to these questions. Only after this is accomplished it will be possible to take the next decisive step in the conquest of cosmos, the launching of a manned rocket into interplanetary space.

As is obvious from the list of missions of the instrumentation of the single-stage ballistic rocket which made its flight on July 2, scientists will receive new data on a wide range of questions and knowledge of the nature of the upper atmosphere will be increased substantially.

Of special interest is that part of the investigation program connected with the study of animal physiology during the high-altitude ascent. The flight of two dogs and a rabbit [Fig. 2] and their successful landing has made data available on the preparedness of animals for the unusual conditions of increased weight and weightlessness.

In addition, this latest rocket flight will make it possible to verify the information on the properties of the upper atmosphere which are also necessary for more "earthbound" problems such as, for instance, the increase in reliability of further radio communications and the study of the events of high-altitude flight.

According to preliminary data the entire wide-range program of investigation, was successfully accomplished. Valuable information was obtained. This communique should felicitate everybody who holds dear the ideals of peaceful progress of humanity.

3. E. Mustel[2]: A TREMENDOUS SCIENTIFIC ACHIEVEMENT

The high-altitude flight of a ballistic rocket with instrumentation and experimental animals appears to be one more tremendous achievement of Soviet science.

Of great importance is the fact that the equipment and experimental animals returned to Earth safely. Because of this fact, the scientific data to be obtained from the analysis of materials of this flight will be extremely valuable.

Also of great importance is the fact that instruments were installed aboard the rocket to detect distant ultraviolet solar radiation. This radiation creates a layer which conducts electricity in the upper layers of our atmosphere called the ionosphere; it makes possible short wave radio communication at far distances.

Great practical value is ascribed to the study of the ionosphere at the present time. It is especially important to know the mechanism of its formation.

---

[2]Corresponding Member of the Soviet Academy of Sciences.

A reliable answer to this question can be obtained only by means of instruments aboard rockets and artificial Earth satellites especially designed for the study of solar ultraviolet and X-radiation.

Each observation of this type represents a separate value in itself, because the level of solar activity and with it the intensity of the ultraviolet radiation changes with time. By analyzing solar ultraviolet-ray fluxes and the physical condition of the ionosphere, it will be possible to draw an especially complete and substantiated conclusion on the problem of how the various layers which form the ionosphere were created.

The study of the formation and composition of the ionosphere is of great value. In particular, considerable information can be obtained through the direct analysis of the light gases which are found in the ionosphere. It appears, from the preliminary processing of materials from ballistic rockets, that information on the content of light gases in the atmosphere have been obtained for the first time.

The successful flight of the ballistic rocket is the latest substantial contribution to scientific knowledge about the Earth and the formation of its atmosphere; this is a great contribution of Soviet science towards the realization of the great program of observations for the International Geophysical Year.

4. SCIENTISTS PEEK INTO COSMOS

Many problems are solved by the study of cosmic rays. By studying their content, by guessing their possible original sources, and by the investigation of their interaction with the magnetic field and atmosphere of the earth, scientists

can also judge the chemical content, extent, material structure, and elementary particles of space.

Soviet scientists have made a great contribution in the development of this important field of science by their theoretical work and investigation of cosmic particles with the help of spherical probes known as artificial earth satellites and the cosmic rocket. The Seventh International Conference on Cosmic Rays, organized by the International Union of Pure and Applied Physics, began its work in Moscow yesterday, testifying to the great authority of Soviet science.

At the capital of the Soviet Union arrived scientists from many countries: USA, England, Hungary, India, Italy, Poland, China, Czechoslovakia, Sweden, Japan, and others.

Over 200 papers were submitted to the conference; more than half of these are by Soviet physicists.

The conference opened with a speech by one of the creators of cosmic-ray science, Academician D. V. Skobeltsyn. He was followed by the great English scientist S. Powell, and the American physicist B. Rossi.

The papers which were delivered at the first session were dedicated to one of the basic problems of cosmic-ray science--nuclear interaction of high energies.

B. Izvestia, July 8, 1959

1. V. Parein[3]: THE THIRD FLIGHT OF "COURAGEOUS"

It has been said many times that in order for men to undertake their first cosmic flight, it is necessary not only to eliminate all technical difficulties connected with this problem but also to protect the future astronauts from all unexpected dangers which might appear during the flight. Will a man be able to withstand the effects of acceleration during the ascent of the rocket? Will a man be able to adapt himself to such an unusual condition as dynamic weightlessness? Only numerous and thorough experiments with animals can give a reliable answer to these questions.

Previous experiments have shown that animals can satisfactorily live through the short-duration, intense acceleration of the first moments of flight, as well as the condition of weightlessness. Already the fact that the dog "Courageous" has undertaken this journey for the third time aboard a rocket without ill effects testifies to the fact that animals can adapt themselves to such unusual conditions.

The basic feature of the last experiment, which was accomplished using a single-stage geophysical ballistic rocket, is the observation of muscular coordination and the functioning condition of the muscular systems of animals.

Such observation is extremely important. We have to know how a future cosmic pilot, who will have to tackle complicated problems connected with guiding the ship, will behave in a condition of weightlessness. It is necessary to know

---

[3]Active member of the Soviet Academy of Medical Sciences.

for how long a period he will lose his orientation in space, and finally, whether he will be able to harmonize his movements.

It is too early as yet to discuss the data obtained in detail, because the material is being processed and studied at present. But on the basis of the preliminary data of the last flight it is possible to say without fear of exaggeration that our scientists have obtained information of scientific and practical importance.

2. E. Kreps[4]: THIS IS VERY INTERESTING

The preliminary physiological data obtained during the launching of the second Soviet Earth satellite with the dog Leika aboard have made it possible to establish a set of important new facts, for example, the possibility for animals to live through the conditions of weightlessness, great acceleration, and intense radiation fluxes.

The return of animals to earth [e.g. the rocket of July 2] has made possible a whole series of bio-chemical investigations of experimental animals, studies of the influence of flight on all functions of their bodies, and examinations of the condition of blood-creating organs and other systems which are especially sensitive to the influence of radiation. Of undoubted interest is the investigation of the influence of flight conditions on the central nervous system. The study of the effects on the central nervous system of a highly organized creature such as a dog of a lengthy stay in the upper atmosphere, and also in cosmic space, is of special interest in regard to repeated flights of animals.

---

[4]Corresponding member of the Soviet Academy of Sciences.

Soviet scientists are very proud that the new science of "cosmic physiology" is being successfully developed in our country, which is building a Communist society.

3. WHERE IS "SNOWFLAKE"?

In yesterday's Izvestia was printed a photograph of two fearless astronauts--the dog "Courageous", and a rabbit.

During the day we have received numerous telephone calls requesting information about the second dog, "Snowflake", who was not included in the picture. Had something happened to her?

We would like to announce that "Snowflake" is alive and healthy. Like her fellow travelers in cosmic flight, she feels fine. She did not appear in the photograph only because she was undergoing a series of tests which will help clarify what effect the flight had on her body.

II. V. Lutsky[6]: WHERE IS THE SOVIET SOLAR SATELLITE NOW? Izvestia, September 2, 1959

It is eight months today from the historic moment when the multi-stage cosmic rocket took off from the territory of our country. People on all continents of the world attentively followed the glorious flight of this new heavenly body.

According to a pre-determined program the Soviet cosmic rocket passed near the surface of the Moon at a distance of five or six thousand kilometers, and, on January 8, 1959, entered an orbit, thus becoming a satellite of the Sun. It

[6]Director of Moscow Planetarium.

took only 34 flight hours for the rocket to cross the lunar orbit and during an additional 28 hours the rocket's radio station continued to work, transmitting valuable information about the cosmos to Earth.

The rocket flight was also recorded with the help of cameras in a series of Soviet observatories, as well as by observatories of the United States of America and other countries. Pictures were taken of the artificial comet--the gigantic sodium cloud extending for hundreds of kilometers. This cloud was created by special equipment installed in the rocket at a distance of 113,000 km from the Earth, on January 3 at 3:56:20 a. m. Moscow time. These pictures have made it possible to pinpoint the trajectory of the rocket and also to prove the feasibility of the method which might be used in the future for signalling in interplanetary space.

When the cosmic rocket entered its elliptical orbit between the Earth and Mars, the Earth's gravitational pull did not have any noticeable effect on its flight. At this time the rocket was travelling with a speed of 32.2 km/sec in relation to the Sun and was located at a distance of 147 million kilometers from the Sun.

In spite of the fact that optical observations or radio contact with the cosmic rocket do not exist any more, due to the great distance, accurate theoretical calculations of its movement, which are verified by radio signals from the initial sector of its flight and photographs of the artificial comet, make it possible to calculate the path of the rocket in interplanetary space.

Two weeks after the launching, on January 14, the cosmic rocket was located at the perihelion--that is, at the closest approach to the Sun, 146.4 million kilometers. The velocity of the rocket was the highest at this moment. By April 27 our planet the Earth had "overtaken" the rocket (since the Earth's

trajectory is closer to the Sun and consequently its velocity is greater). But at the same moment the distance between the Earth and the rocket was about 18 million kilometers. Then the Earth began to lead the rocket noticeably.

At this moment the Soviet solar satellite has already completed one-half of its annual rotation period of 450 days. Since entering the orbit, the cosmic rocket has traveled more than 500 million kilometers, and is located now at its aphelion, --the greatest distance from the Sun, 197.2 million kilometers. It is not difficult to calculate its present velocity, which is 23.9 kilometers per second.

As is obvious from the diagram [Fig. 3] , the Earth has at this moment considerably outdistanced the new solar satellite; the distance between the Earth and the new satellite exceeds 120 million kilometers.

When will the rocket approach the Earth again? In order to answer this question it is necessary to calculate the correlation of their rotation periods. An accurate calculation of this type is difficult, since the Earth year is 365.25 days and the rocket "year" is 450 days or 1.23 terrestrial years, but a comparably close approach will take place in about five years and a particularly "close" approach will take place in January of the years 1975, 2028, and 2044. Over a period of 16 years the rocket will be late to reach the meeting point by 6 days; after 69 years the rocket will reach the point three days ahead of time; and after 85 years the rocket will be three days late again. Even during these meetings the distance between the Earth and the rocket will be several million kilometers.

It is possible that at these times, with the help of astronomical instruments, men will be able to see and take pictures of the tiny flying star in the sky which will be our cosmic rocket, the satellite of the Sun which carries through interplanetary space a proud banner with the symbol of the Soviet Union.

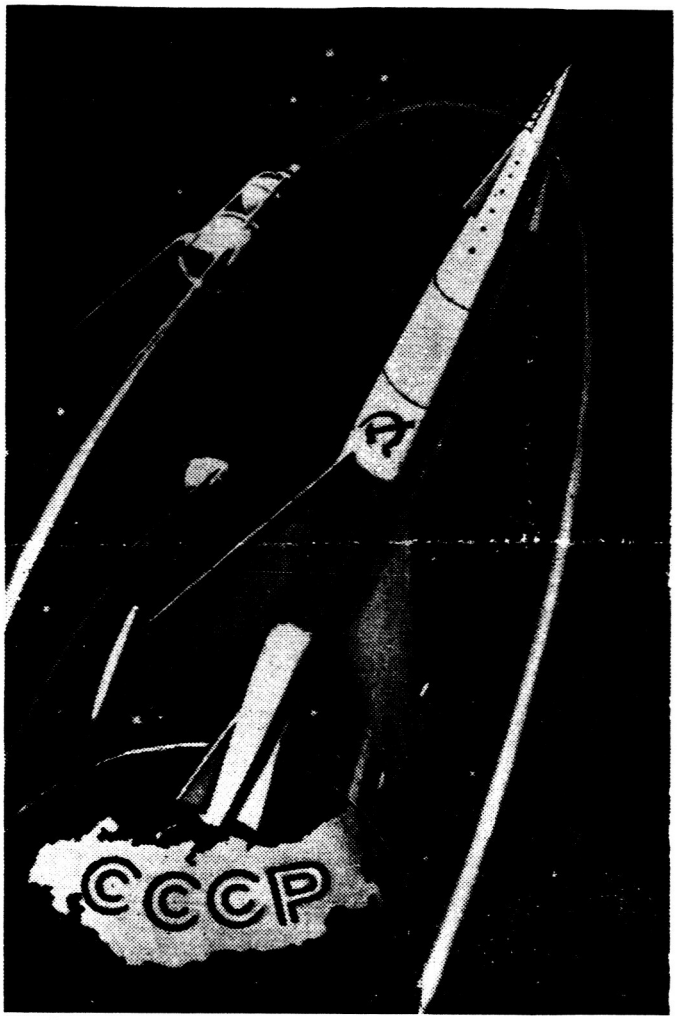

Fig. 1. Poster Showing Soviet Rocket and Instrument Packages

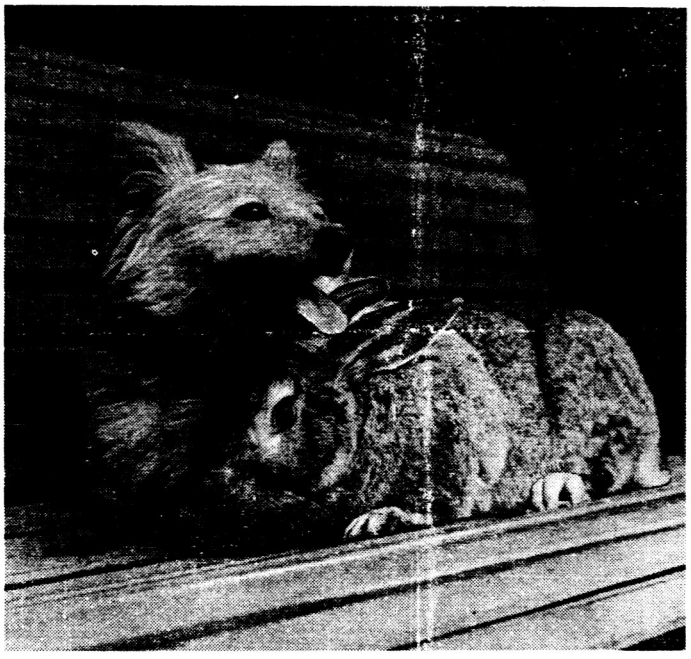

Fig. 2. The Dog "Courageous" and the Rabbit, Launched in the Geophysical Ballistic Rocket of July 2

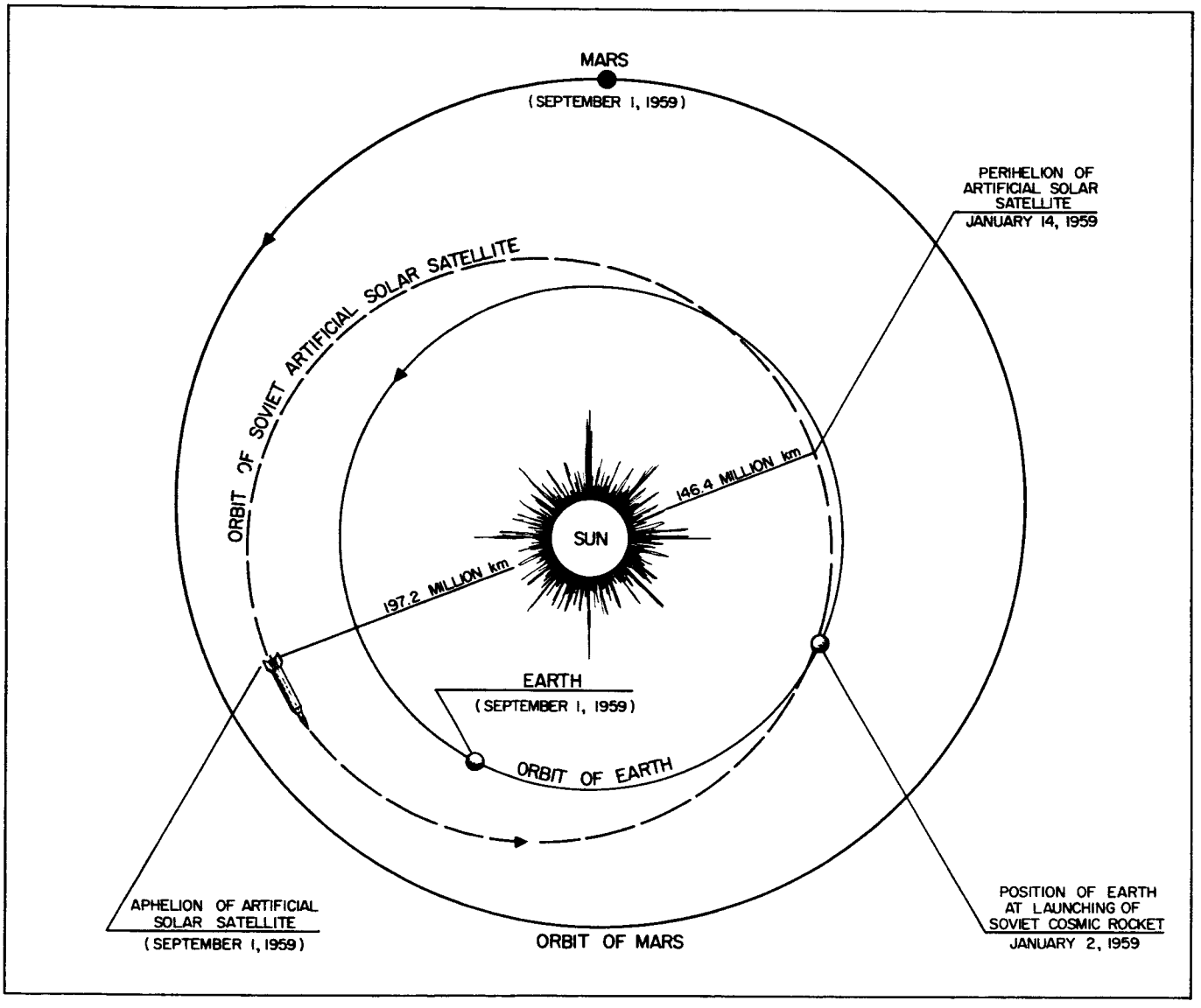

Fig. 3. Position of the Soviet Solar Satellite